

Active Gas Regenerative Liquefier, Phase I

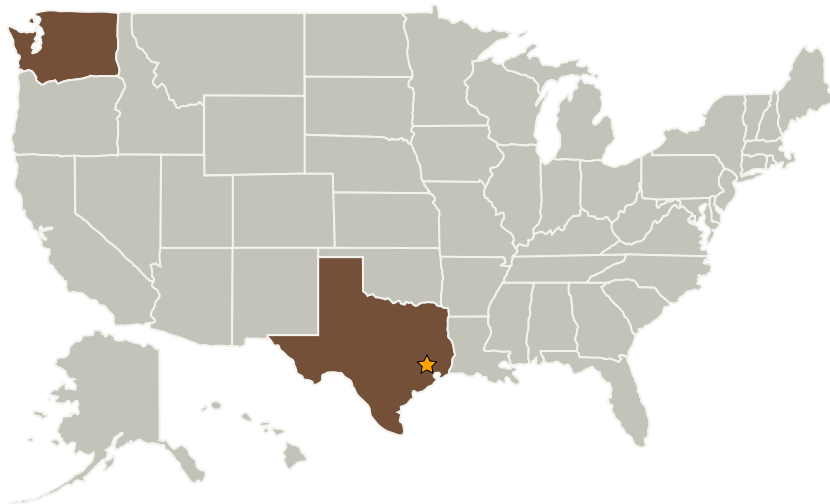
Completed Technology Project (2004 - 2004)



Project Introduction

We offer a novel liquefier that has the potential to simultaneously increase thermodynamic efficiency and significantly reduce complexity. The "active gas regenerative liquefier" (AGRL) uses an array of discrete micro compressor-expander units in a periodic heat exchanger to accomplish extremely efficient liquefaction of hydrogen and other cryogenic fluids. When an array of these units are combined into a highly effective regenerator with excellent heat transfer, low pressure drop, and low longitudinal conduction, the potential for a extremely efficient regenerative refrigerator and/or liquefier is created. The capability to directly couple the compression of a working gas within a unit with the simultaneous expansion of a working gas within the same unit allows distributed work input and recovery from near ambient temperature to cryogenic temperatures as low as ~20 K. By using this micro compressor-expander unit, the net work input is reduced substantially to that required for a very efficient refrigeration cycle, no matter what the temperature span of the liquefier.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
CryoFuel Systems, Inc.	Supporting Organization	Industry	Monroe, Washington



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations

Texas

Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

John A Barclay

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors